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(71) Applicant
Klebert GmbH & Co Kommanditgesellschaft
(Incorporated in the Federal Republic of Germany)
Kettwiger Strasse 12-24, D-5628 Heiligenhaus,
Federal Republic of Germany

(72) Inventors
Frank Kleefeldt
Johannes Theodor Menke

(74) Agent and/or Address for Service
Hulse and Co
Cavendish Buildings, West Street, Sheffield, S1 1ZZ,
United Kingdom

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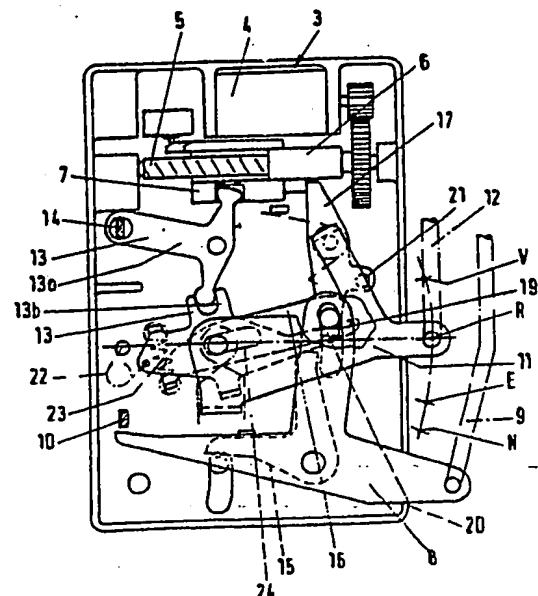
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(54) Motor vehicle door lock

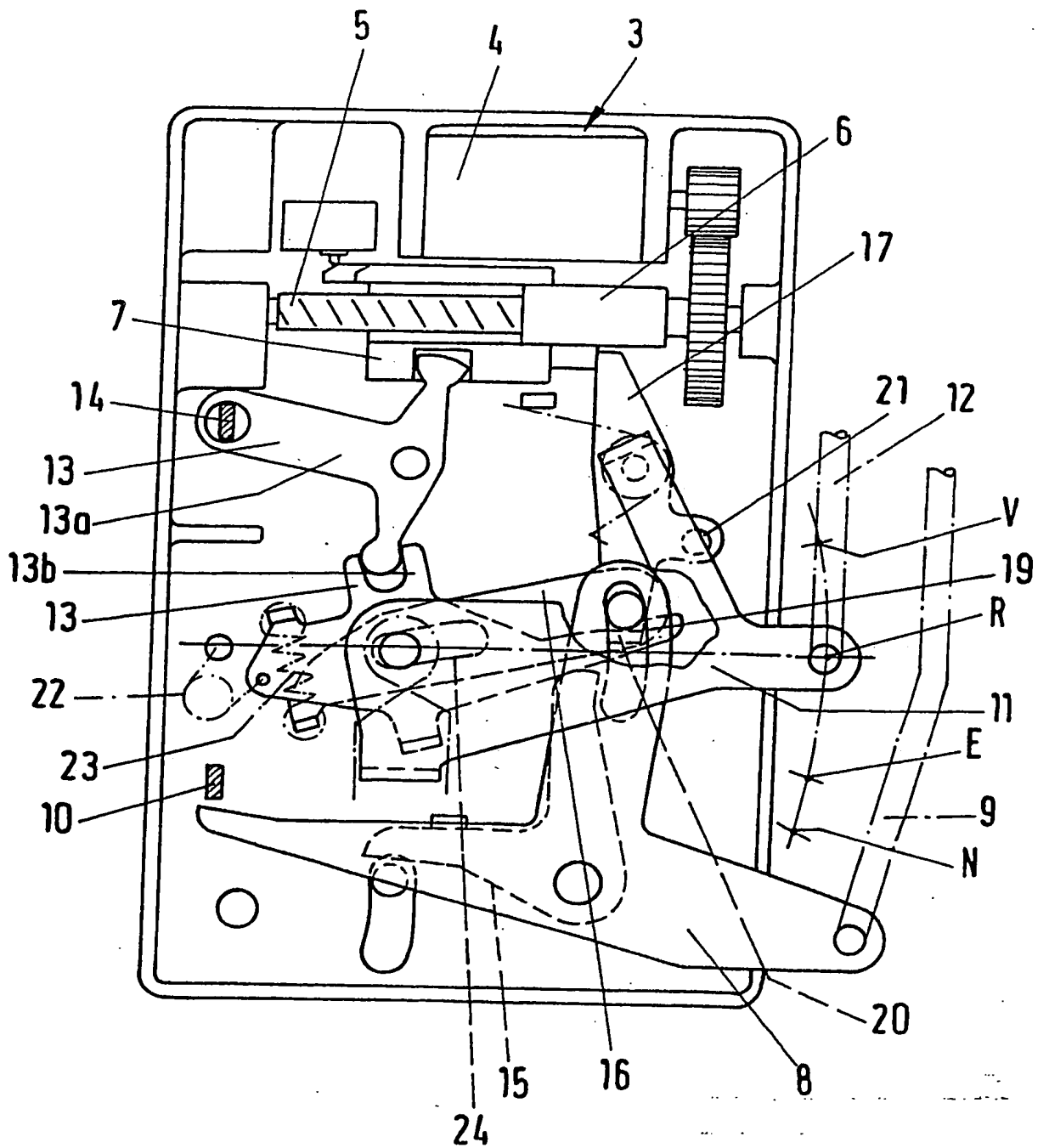
(57) A motor vehicle door lock with a swivel latch (1) and a catch (2), and a central bolt driving system (3), which includes an electric motor (4) and acts through a leadscrew (5), a leadscrew nut (6), and a setting slide (7), together with an external actuating lever (8) connected to the external door handle by a setting rod (9), an internal actuating lever (10), an external bolting lever (11) connected through a setting rod (12) to the lock cylinder or a remote actuator, at least one internal bolting lever (13) connected usually to an internal actuating knob through a component (14), and a releasing lever (15), the external actuating lever (8) acting on the catch (2) through the releasing lever (15), a coupling lever (16) being provided between the external actuating lever (8) and the releasing lever (15), and the leadscrew nut (6) being movable by the central bolt driving system (3) into an anti-theft setting, characterised in that anti-theft security is assured by an anti-theft security lever (17) actuated from the central bolt driving system (3), the anti-theft security lever (17) in its security anti-theft setting uncoupling both the internal bolting lever (13) and the internal actuating lever (10). Fig.1



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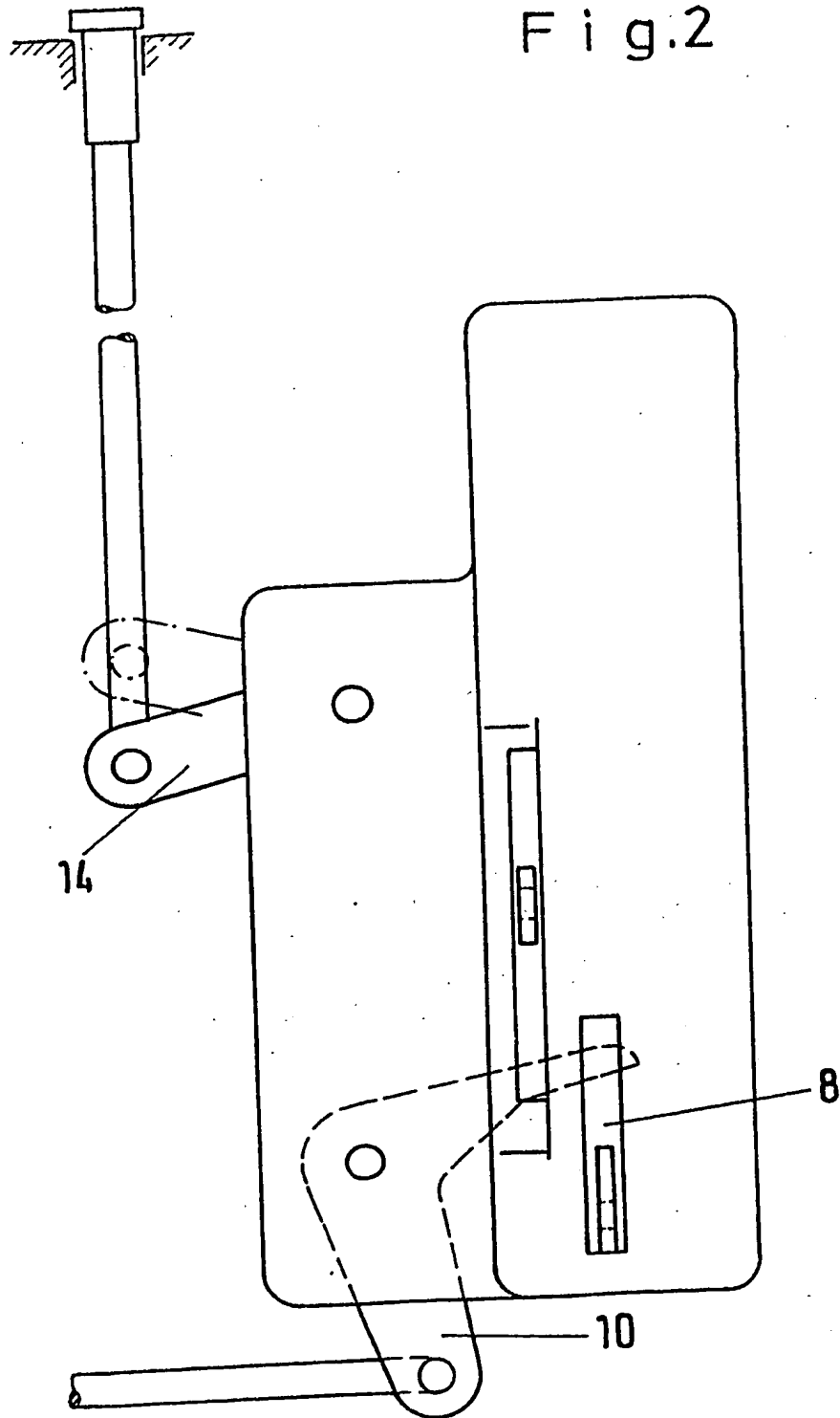
Fig.1



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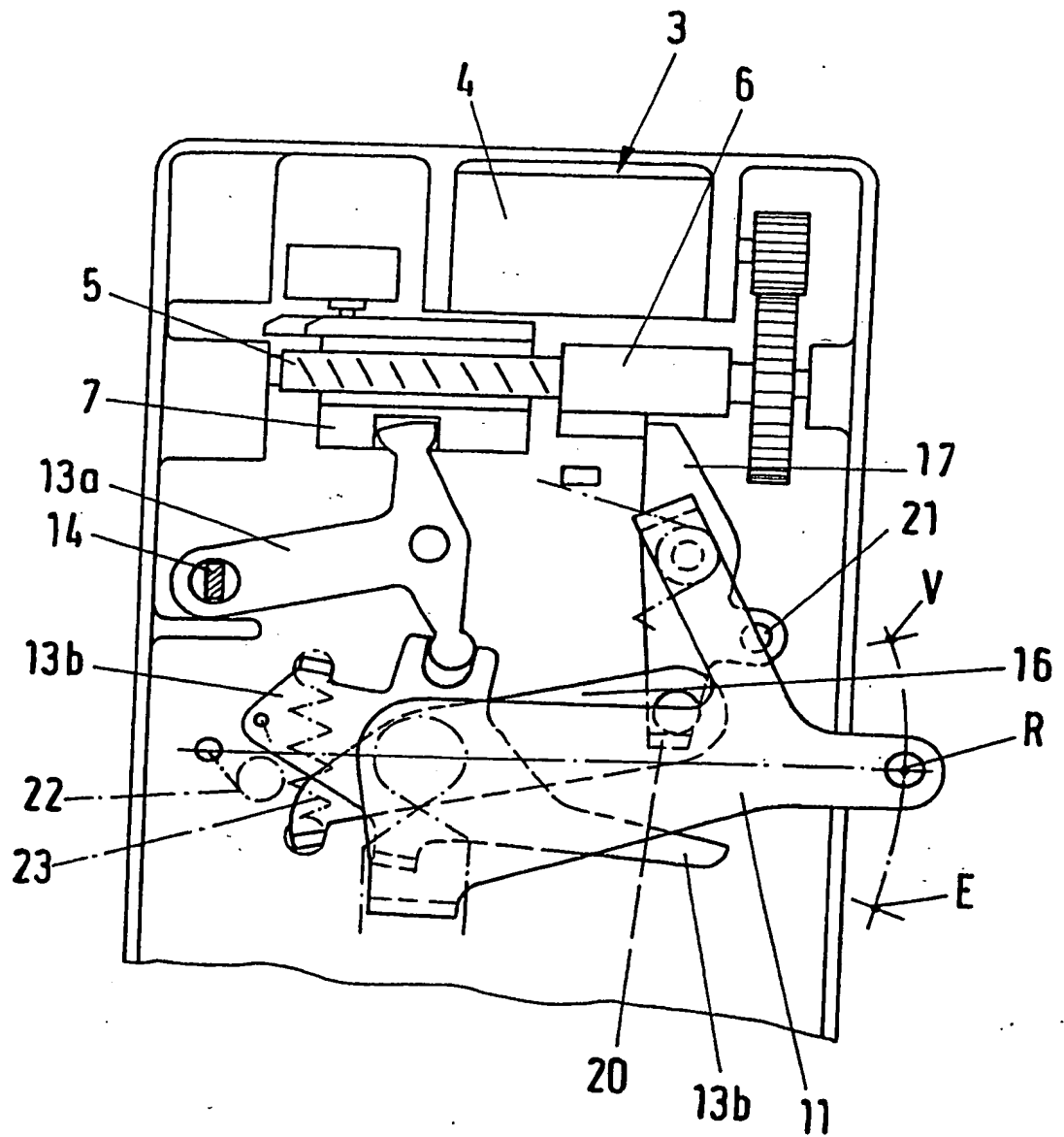
Fig.2



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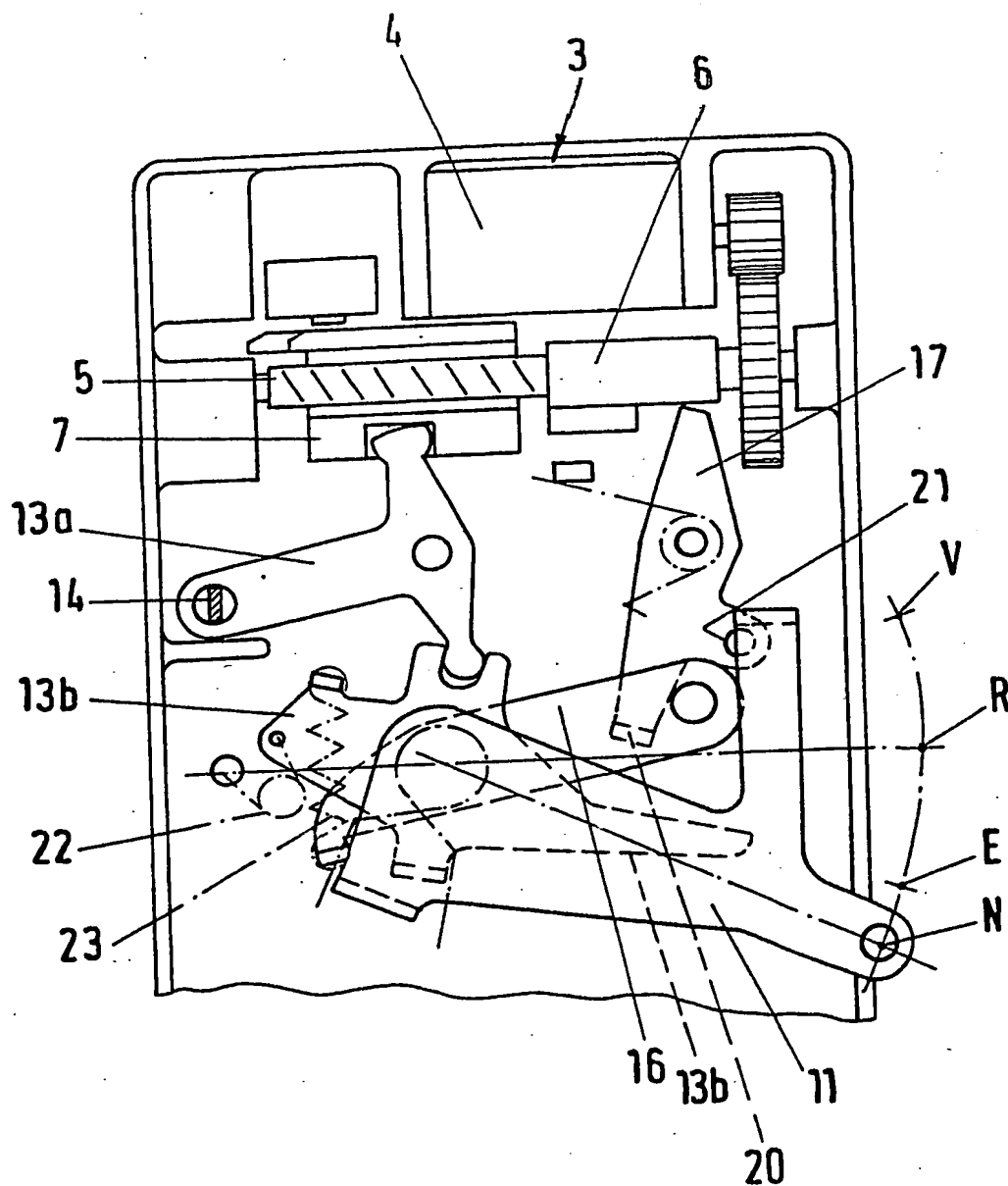
Fig.3



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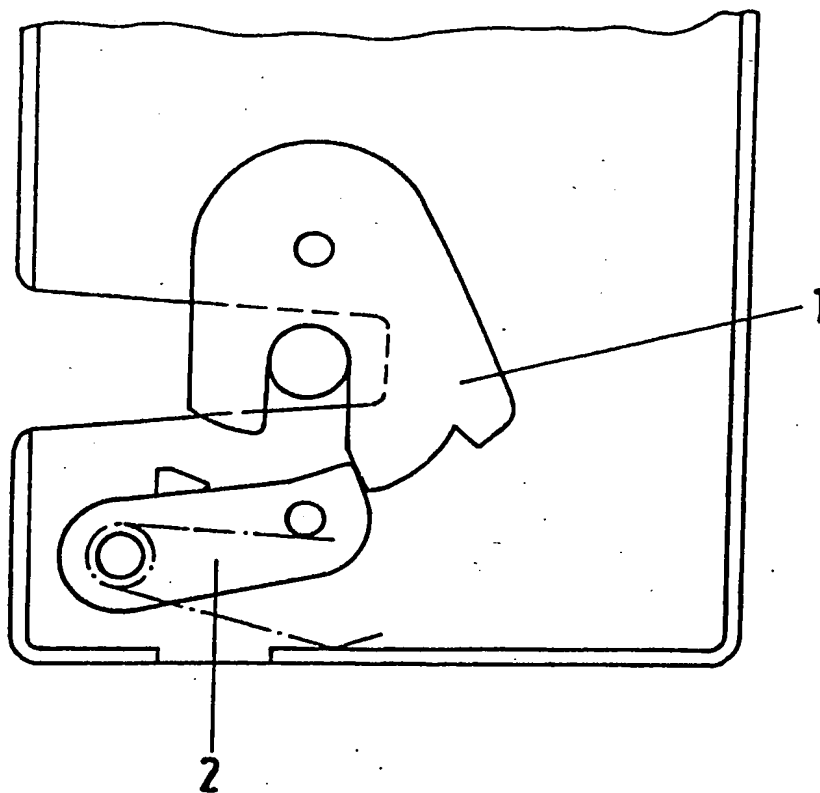
Fig.4



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Fig.5



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MOTOR VEHICLE DOOR LOCK

This invention relates to a motor vehicle door lock having a swivel latch, a catch, and a central bolt driving system incorporating a leadscrew, a leadscrew nut and a setting slide, together with an external actuating lever, an internal actuating lever, an external bolting lever, at least one internal bolting lever and a releasing lever, the external actuating lever acting on the catch through the releasing lever, a coupling lever being provided between the external actuating lever and the releasing lever, the leadscrew nut being movable by the central bolt driving system into an anti-theft setting, and anti-theft security being provided. The term "anti-theft security" signifies that in the anti-theft setting the motor vehicle door lock cannot be moved into the open setting by the unauthorised manipulation of the internal bolting lever or the internal actuating lever. Unauthorised manipulation of the internal bolting lever or the internal actuating lever can ensue for example after breaking a window in the motor vehicle door. The external actuating lever is generally connected to the external door handle. It is self-evident that the external bolting lever is connected to the lock cylinder or a remote actuator. The internal bolting lever is usually connected to an internal actuating knob through a setting rod.

In the motor vehicle door lock of prior art to which the invention relates (cf. DE-PS 29 11 630 and GB-PS 2 167 803), the system is so arranged that in the anti-theft setting both the internal bolting lever and the internal actuating

lever are immobilised. This is intrinsically sound, but it follows that the internal bolting lever and the internal actuating lever must withstand the substantial loads set up when unauthorised attempts are made to force the anti-theft security system. They, along with their fixings and the associated components, must therefore be appropriately constructed with respect to their strength and stability. This is costly.

The object of the invention is to improve a motor vehicle door lock of the type described so that its strength and stability can be ensured by much less costly means.

According to the present invention, an anti-theft security lever is provided, to be actuated from the central bolt driving system, the anti-theft security lever in its secure anti-theft setting uncoupling both the internal bolting lever and the internal actuating lever. This can be effected in various ways. Outstanding simplicity and functional reliability can be achieved, while involving very little additional cost, by providing a two-armed anti-theft security lever swivellably disposed between the central bolt driving system and the coupling lever, on the one hand to be actuated by the leadscrew nut and on the other hand to interact with the coupling lever, the anti-theft security lever immobilising the coupling lever when the leadscrew nut is in its anti-theft setting, and both the internal actuating lever and the internal bolting lever becoming uncoupled in the anti-theft setting. In this case it is preferable to provide the coupling lever with a coupling pin which can move along an

elongated slot in the external actuating lever and thereby come into engagement with the releasing lever, the anti-theft security lever having a flange to engage under and immobilise the coupling pin.

The central bolt driving system for a motor vehicle door lock of the known type, fitted with an electric motor for example, can fail to function. In order to release the anti-theft security system in the present invention under these circumstances, using simple means, it is preferable to provide the anti-theft security lever with an emergency pin that interacts with the external bolting lever, the anti-theft security system being releasable by turning the key of the associated lock cylinder to actuate the external bolting lever.

Further advantages, with respect to the identification of unauthorised manipulations of the motor vehicle door lock of the invention when in its anti-theft setting, can be achieved by providing two interconnected internal bolting levers, the first connected to the internal bolting knob and/or the setting slide, and the second connected to the coupling lever, the second internal bolting lever being controllable by a rocking spring and a tension spring. In this case it can be ensured by making the tension spring weaker than the rocking spring that unauthorised manipulation of the first internal bolting lever will leave the second internal bolting lever undisturbed, so that an attempted break-in can be detected. This arises because the second internal bolting lever also undergoes the uncoupling movement

as described. If this additional detection function is not wanted, the tension spring can be made stronger than the rocking spring. In this case, the disturbance of the second internal bolting lever when the motor vehicle door lock in its secure anti-theft setting is manipulated without authority will be automatically reversed. It is self-evident that in this case the first bolting lever will also be returned to its initial position.

An embodiment of the invention will now be described, purely by way of example, with reference to the accompanying drawings, in which:-

Figure 1 shows a motor vehicle door lock in accordance with the invention after removing some housing components to expose the significant components and the anti-theft security fittings;

Figure 2 is a side elevation of the lock of Figure 1 with its housing intact, showing the internal actuating lever, and showing the connecting means between the internal actuating knob and the internal bolting lever;

Figure 3 shows some components from Figure 1 in a different functional setting, viz., when the internal bolting lever is manipulated without authority;

Figure 4 shows some components from Figure 1 during so-called emergency actuation to release the anti-theft security setting; and

Figure 5 is supplementary to Figure 1, showing the swivel latch and catch components of the motor vehicle door lock lying in a different plane from that of Figure 1.

The motor vehicle door lock shown in the drawings is fitted with a swivel latch 1 and a catch 2 (Figure 5 only), and a central bolt driving system 3, which includes an electric motor 4 and acts through a leadscrew 5, a leadscrew nut 6, and a setting slide 7. Further features of the motor vehicle door lock are an external actuating lever 8 connected to the external door handle by a setting rod 9, an internal actuating lever 10, an external bolting lever 11 connected through a setting rod 12 to the lock cylinder or a remote actuator, at least one internal bolting lever 13, connected usually to an internal actuating knob through a component 14, and a releasing lever 15.

The arrangement is such that the external actuating lever 8 acts through the releasing lever 15 on the catch 2. A coupling lever 16 is provided between the external actuating lever 8 and the releasing lever 15. The central bolt driving system 3 can move the leadscrew nut 6 into an anti-theft setting, so that anti-theft security is thereby provided. The central bolt driving system 3 further incorporates the setting slide 7, which interacts with the leadscrew nut 6 through an interposed uncoupler, and engages with the internal bolting lever 13. Thus far, the kinematics of the system are described in GB-PS 2 167 803. An anti-theft security lever 17 is provided, to be actuated from the central bolt driving system 3. In its secure anti-theft setting, the anti-theft security lever 17 uncouples both the internal bolting lever 13 and the internal actuating lever 10. This is effected by the provision of a swivelling two-armed anti-theft security lever.

17 between the central bolt driving system 3 and the coupling lever 16, on the one hand to be actuated by the leadscrew nut 6 and on the other hand to interact with the coupling lever 16. The anti-theft security lever 17, immobilises the coupling lever 16, when the leadscrew nut 6 is in its anti-theft setting and it is itself in its secure anti-theft setting, as shown in Figure 1. Consequently, in the anti-theft setting both the internal actuating lever 10 and the internal bolting lever 13 can move freely without functioning. In order to attain this security by simple means, the coupling lever 16 carries a coupling pin 18 which can move along an elongated slot 19 in the external actuating lever 11. Thereby it is brought into engagement with the releasing lever 15 when it is intended to actuate it in order to release the catch 2. The anti-theft security lever 17 also has a flange 20 to engage under and immobilise the coupling pin 18, as shown in Figure 1. If the central bolt driving system 3 fails to function, the anti-theft security system can be released by alternative mechanical means. Reference to Figures 1 and 6 will clarify this feature. It will be seen that the anti-theft security lever 17 carries an emergency pin 21 that interacts with the external bolting lever 11. Consequently, the anti-theft security system can be released by turning the key of the associated lock cylinder or remote actuator to actuate the external bolting lever 11 through the setting rod 12. The lock cylinder has a corresponding lock setting. Figures 1 and 4 indicate the different functional settings of the external bolting lever 13 corresponding to the

different lock cylinder settings, - viz., from the top downwards a bolting setting V, a rest setting R (as seen in Figure 1), an unbolting setting E and an emergency actuation setting N.

It should be noted that two interconnected internal bolting levers 13 are provided, the first 13a connected to the component 14 and the setting slide 7 and the second 13b connected to the coupling lever 16, the second internal bolting lever 13b being controllable by a rocking spring 22 and a tension spring 23. In this case, the elongated slit 24 allows the coupling lever 16 the freedom of movement required for the interaction of the coupling pin 18 in the elongated slit 19.

The kinematics and functions of the system as described can be clarified by a comparative examination of Figures 1, 2, 3, 4 and 5. Figure 1, as already pointed out, shows the secure anti-theft setting. The leadscrew nut 6 is in its anti-theft setting. It has taken the anti-theft security lever 17 into the setting shown in Figure 1. The flange 20 on the anti-theft security lever 17 is engaged under the coupling pin 18 on the coupling lever 16. Consequently, the coupling lever 16 cannot be moved from the setting R shown into the unbolting setting E. If unauthorised attempts are made to force the motor vehicle door lock by moving the component 14 through the internal bolting knob 25, then the levers 13a and 13b, the freely moving slide 17 and the rocking spring 22 will all move into their unbolting settings, as shown in Figure 3, but the coupling lever 16 will not move.

The tension spring 23 will be extended. A balance of forces can be established between the rocking spring 22 and the tension spring 23, and there are two alternatives. In the one case, the tension spring 23 is weaker than the rocking spring 22. If unauthorised attempts are made to force the motor vehicle door lock as described above, this force balance between the rocking spring 22 and the tension spring 23 will bring the bolting system into the setting produced by the said unauthorised attempts. It will therefore be obvious that an attempt has been made to break into the vehicle. However, the alternative is to make the tension spring 23 stronger than the rocking spring 22. In this case, the forced movements will not be permanent, and the tension spring 23 will restore the original setting.

Figure 4 shows the situation that arises when power failure necessitates emergency actuation of the motor vehicle door lock. Emergency actuation is effected from the external bolting lever 11. This is initially shifted from the setting shown in Figure 1 to the unbolting setting E, taking with it the entire bolting system including the paired internal bolting levers 13a and 13b. The coupling lever 16 initially remains in its bolted setting, and the tension spring 23 is extended. Continued movement of the external bolting lever 11 into the emergency actuation setting N swivels the anti-theft security lever 17 into a setting in which the coupling lever 16 is released. The tension spring 23 then swivels it into the unbolted setting. Consequently, the motor vehicle door lock can now be opened, through the external actuating

lever 8 or the internal actuating lever 13, if the latter is actuated through the component 14. Manual bolting is possible in all circumstances. The pin 18 on the coupling lever 16 remains on the underside of the anti-theft security lever 17.

CLAIMS

1. A motor vehicle door lock having a swivel latch, a catch, and a central bolt driving system incorporating a leadscrew, a leadscrew nut and a setting slide, together with an external actuating lever, an internal actuating lever, an external bolting lever, at least one internal bolting lever, and a releasing lever, the external actuating lever acting on the catch through the releasing lever, a coupling lever being provided between the external actuating lever and the releasing lever, the leadscrew nut being movable by the central bolt driving system into an anti-theft setting, an anti-theft security being provided, wherein an anti-theft security lever is provided, to be actuated from the central bolt driving system, the anti-theft security lever in its secure anti-theft setting uncoupling both the internal bolting lever and the internal actuating lever.

2. A motor vehicle door lock as in Claim 1, wherein a two-armed anti-theft security lever is swivellably disposed between the central bolt driving system and the coupling lever, on the one hand to be actuated by the leadscrew nut and on the other hand to interact with the coupling lever, the anti-theft security lever immobilising the coupling lever when the leadscrew nut is in its anti-theft setting, and both the internal actuating lever and the internal bolting lever becoming uncoupled in the anti-theft setting.

3. A motor vehicle door lock as in Claim 2, wherein the coupling lever is provided with a coupling pin which can move along an elongated slot in the external actuating lever.

and thereby come into engagement with the releasing lever, the anti-theft security lever having a flange to engage under and immobilise the coupling pin.

4. A motor vehicle door lock as in any one of Claims 1 to 3, wherein the anti-theft security lever is provided with an emergency pin that interacts with the external bolting lever, the anti-theft security system being releasable by turning the key of the associated lock cylinder or remote actuator to actuate the external bolting lever.

5. A motor vehicle door lock as in any one of Claims 2 to 4, wherein two interconnected internal bolting levers are provided, the first connected to the internal bolting knob and/or the setting slide, and the second connected to the coupling lever, the second internal bolting lever being controllable by a rocking spring and a tension spring.

6. A motor vehicle door lock substantially as hereinbefore described with reference to the accompanying drawings.

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